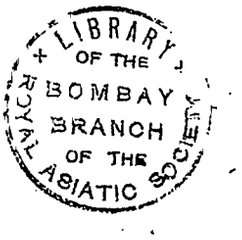
REPORT

OF THE

CHEMICAL ANALYSER TO GOVERNMENT, BOMBAY,

FOR THE YEAR 1887.

C.P.A. 31



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REPORT

OF THE

CHEMICAL ANALYSER TO GOVERNMENT, BOMBAY,

FOR THE YEAR 1887.

To

THE SECRETARY TO GOVERNMENT,
General Department,
Bombay.

SIR,

As Chemical Analyser to the Government of Bombay I have the honour to submit the following report for the year 1887, being the seventeenth Annual Report of this Department.

2. The following is a summary of the work done by the Department during the year under report:—282 medico-legal cases, involving the separate analysis or examination of 835 different articles, were investigated and reported on. In addition, 207 samples of potable water, and 1,059 samples of Government stores and miscellaneous articles were examined or analysed, making a gross total of 2,101 different articles examined or analysed during the year.

3. The table, which follows, shows the number of the medico-legal cases reported on and other analyses effected, during each of the last five years:—

Class.	1883.*	1884.	1885.	1886.	1887.
Medico-legal cases	218	311	336	296	282
Potable waters	61	98	108	112	207
Government stores	681	384	348	444	355
Customs and Ábkári analyses		493	576	479	652
Miscellaneous	51	82	88	92	52
Total ...	1,011	1,371	1,456	1,423	1,548

* Nine months only.

Section I.—Medico-Legal.

4. The 282 medico-legal cases, referred to this office during the year 1887, were forwarded from 107 different stations, and may, as usual, be divided into three classes, *viz.*, (1) cases of real or alleged poisoning of human beings, (2) cases of real or alleged cattle-poisoning, and (3) other cases, chiefly cases involving the examination of articles suspected to be stained with blood or other animal fluids. Of the 282 medico-legal cases referred to this office during the year under report, 159 belong to the first, 84 to the second, and 39 to the third of these classes. The table below gives corresponding figures for the past five years:—

Class.	*1883.	1884.	1885.	1886.	1887.
Suspected human-poisoning	138	169	187	159	159
Do. cattle-poisoning...	45	103	101	83	84
Blood stains, &c.	35	42	48	54	39
Total ...	218	311	336	296	282

* Nine months only.

5. *Cases of suspected human-poisoning.*—Of the 159 cases of this class referred for examination and report during the past year, some poison or other was detected in 84, or about 52·2 per cent. The average percentage of detections for the eight immediately previous years was 51·7 per cent.

6. The table, which now follows, shows the general nature of the poison found in each of the 84 cases of alleged human-poisoning in which poison was detected during the year. The cases are distributed according to the districts from which they were forwarded:—

Districts.	Arsenic.	Pounded Glass.	Other Mineral Poisons.	Opium.	Dhatura.	Other Organic Poisons.	Total.
Ahmedabad	...	...	...	...	1	...	1
Ahmednagar	3	...	1	...	...	2	6
Belgaum	3	...	...	...	1	...	4
Bombay	1	...	4	2	...	...	7
Broach	1	...	...	...	...	...	1
Dhárwár	2	2	...	1	...	...	5
Kaira	2	...	...	2	1	...	5
Kaládgi	2	...	2	...	...	1	5
Kolába	3	2	...	...	...	...	5
Khándesh	1	...	1	2	1	...	5
Násik	5	...	...	2	...	2	9
Poona	...	...	...	4	...	...	4
Panch Mahálś...	1	...	...	...	...	...	1
Ratnágiri	1	...	...	...	...	...	1
Sátára	...	...	2	...	...	1	3
Sholápur	3	...	...	1	...	1	5
Thána	3	...	...	...	...	...	3
Sind	3	...	...	...	1	1	5
Mhow and other Cantonments ...	...	...	1	...	...	...	1
Total ...	34	4	11	14	5	8	76
Native States	2	...	...	...	...	...	2
Central Provinces and Berárs ...	6	...	...	...	...	...	6
Grand Total ...	42	4	11	14	5	8	84

7. So far as can be made out from the reports furnished to this office, the 84 cases of alleged human-poisoning, in which poison was detected during the past year, included the poisoning of 95 persons, of whom 37 died. As will be seen from the table which follows, these figures are about the same as those of 1884, and lower than those of the last two years:—

	1883.*	1884.	1885.	1886.	1887.
A.—Cases—					
Arsenic	31	47	51	47	42
Opium	17	9	20	12	14
Dhatura	5	4	5	4	5
Other poisons	18	23	26	26	23
Total cases ...	71	83	102	89	84
B.—Persons poisoned—					
Arsenic	29	50	91	88	47
Opium	17	9	18	11	13
Dhatura	33	10	17	13	21
Other poisons	6	29	27	16	14
Total persons poisoned ...	85	98	153	128	95

* Nine months only.

	1883.*	1884.	1885.	1886.	1887.
C.—Deaths—					
Arsenic	18	22	32	31	20
Opium	15	9	18	11	13
Dhatura	4	1	...	...	2
Other poisons	2	3	14	8	2
Total deaths ...	39	35	64	50	37

* Nine months only.

8. Below is a more detailed statement showing the poison found in each of the 84 cases referred to :—

Poisons.	Cases.
Arsenious oxide	38
Sulphides of arsenic	2
Arsenite of copper	2
Pounded glass	4
Red lead	3
Chlorides of mercury	1
Nitric acid	1
Copper	6
Opium	14
Dhatura	5
Strychnia	2
Cerbera thevetia	3
Nerium odorum	2
Calotropis gigantea	1
	84

9. *Arsenic.*—Of the 38 cases in which arsenious oxide was detected during the year, 6 were cases in which more than one person was poisoned. A summary of these is as follows :—(1) A case from Mahád (Kolába District), in which arsenious oxide was found in the vomit of 2 persons—brothers—alleged to have been poisoned by the wife of one of them, the poison having been given in food. (2) A case from Belgaum, in which a man and his family—number not stated—suffered from symptoms of irritant poisoning, after eating some bread found on examination to contain arsenious oxide. (3) A case from Karáchi, in which the same poison was found in the vomited matters of a European, who with his wife and child were attacked by vomiting after a meal. (4) A case from Soráth (Káthiáwár), in which arsenic was found in the vomit, mixed with earth, of 5 persons who suffered from symptoms of irritant poisoning, after eating food prepared by a woman. (5) A case from Dhárwár, in which 2 children were poisoned by arsenious oxide given to them in sweetmeat. One of these, a girl aged ten, died four hours after eating the poisoned sweetmeat. In the fatal case the symptoms were peculiar, there was but little vomiting, and no purging. (6) Lastly, in a case from Jath, arsenious oxide was found in some bread and cooked dall, a portion of the food eaten by 7 persons of one family, *viz.*, 4 adults and 3 children, all of whom suffered thereafter from symptoms of irritant poisoning, but recovered.

10. 19 more of the cases in which arsenious oxide was detected were fatal cases in which only one individual was poisoned. In 10 of these the victims were adult males. Of the 10, two from respectively Násik and Ellichpur, appear to have been cases of suicide; in the Násik case opium as well as arsenic was found in the viscera, and in the Ellichpur case the quantity of arsenious oxide found in the contents of the stomach was exceptionally large, *viz.*, 115 grains. A third case, from Buroor, in which some white particles picked out of matters vomited by a man deceased, were identified as particles of arsenious oxide, was probably also one of suicide. In 2 cases, from respectively Karmála (Sholápur District) and Kamber (Shikárpur District), it was reported that

husbands had been poisoned by their wives; in the Kamber case the man did not die until ten days after the alleged administration of the poison, and arsenic, although detected in the liver, could not be detected in the stomach-contents. The other cases in which male adults died were—(6) A case from Bassim (Central Provinces) in which the poison was supposed to have been given in bread and cooked pulse. (7) A case from Thána; in this case it was reported that a man while feeding his child with milk, found a white substance therein which he ate, dying shortly afterwards from its effects. (8) A case from Kalyán, in which on examination of the viscera of a man, reported by the Police to have died of opium-poisoning, about three grains of arsenious oxide was found therein. (9) A case from Násik, in which arsenic was found in the viscera of, and matters vomited by, a man, who was attacked by the usual symptoms of irritant poisoning shortly after a meal; and (10) a case which occurred in Bombay, in which arsenic was found in the viscera of a man who, it was alleged, died from the effects of a poisonous dose of arsenious oxide administered to him in sweetmeat by another man. In 7 more of the fatal cases in which arsenious oxide was detected, the persons killed were adult females. In 2 of these, from respectively Shirpur (Khándesh District) and Násik, the administration of the poison appears to have been connected with an attempt to procure abortion. In the first mentioned case, deceased was a Hindu widow about two months gone in pregnancy. In the second case arsenic was found in the contents of the stomach and liver of a female, in whom abortion had been caused probably by mechanical violence, as the uterus was found ruptured at the fundus. 3 more of the 7 cases, in which female adults were killed, were cases in which poisoning was not suspected at the time of death. In one of these, from Bálápur (Akola District), the viscera were sent for analysis, owing to appearances being found on *post-mortem* examination, indicative of death from irritant poisoning. In another, from Párner (Ahmednagar District), deceased was supposed to have died from cholera; and in the third, from Jacobabad, the body of the deceased was exhumed fourteen days after interment. The remaining 2 fatal cases in female adults were—(16) A case from Jambusar (Broach District), in which arsenic was found in the viscera of a married female who had been carrying on an intrigue with a paramour; and (17) a case from Ellichpur, in which a woman was said to have been poisoned by her sister-in-law, the poison having been administered in bread. In 2 cases young persons were killed, *viz.*, (18) in a case from Akola, in which the victim was a boy, aged three, who died ten hours after eating some bread and dall supposed to have contained the poison; and (19) a case from Pen (Kolába District), suspected to be one of homicide, in which arsenic was found in the vomited matters and viscera, of a youth aged sixteen.

11. Of the remaining 13 cases in which arsenious oxide was detected during the year, in 3, from respectively Párner (Ahmednagar District), Pen (Kolába District), and Belgaum, the poison was detected in matters vomited by male adults, who subsequently recovered. The Párner case was an attempt by a wife to poison her husband. In this case arsenious oxide was found not only in the vomited matters, but also in some scrapings from two stones which had been used to pound the poison. Accused seems to have abstracted the poison from the medicine bag of her father, a hakim. In the Pen case the man in whose vomit arsenic was detected, had been admitted into hospital suffering from symptoms of irritant poisoning; and in the Belgaum case the sufferer—a Hindu—was attacked with symptoms of irritant poisoning, after drinking the remains of a bottle of beer, given to him by another man. In 6 cases the poison was detected in articles of food, *viz.*, (4) in a case from Bhiwndi (Thána District), in which arsenious oxide was detected in some sweetmeat. In this case the fragments of the poison were so large as to be easily visible, and in consequence of this the sweetmeat was not eaten by the man to whom it had been given. (5) and (6) In two cases from respectively Sholápur and Vengurla. In these cases the poison was detected in articles of food prepared by wives for their husbands. (7) In a case from Bijápur, in which a man was caught in the act of putting a paste containing arsenious oxide into a pot in which a quantity of dall was being cooked for another man. (8) In a case from Borsad (Kaira District), in which a male adult was poisoned but recovered; and (9) in a case from Yeola (Násik District), in which arsenious oxide was found in

some powder said to have been scraped from the inside of a glass vessel. Complainant in this case accused a man of attempting to poison him by offering him liquor in the vessel in question. A curious point about the case was that accused in his defence stated, that complainant was in the habit of taking poison for purposes of intoxication, and while the Police were searching complainant's house, he produced a bottle of white powder, which he admitted that he was in the habit of using as an intoxicant. This powder on examination proved to be hydrochlorate of morphia. Of the remaining 4 cases, in one, from Dohad (Panch Maháls District), a powder, found to consist chiefly of arsenious oxide, was, it is alleged, sent anonymously to a woman for the purpose of poisoning her husband's food. The sender of the poison in this case was suspected to be the woman's mother, who had had a quarrel with her son-in-law. In another, from Yeola (Násik District), arsenious oxide, oxide of zinc, and opium, were found in three separate packets, sent for examination in a case in which a man accused his wife of an attempt to poison him. In a third, from Ahmednagar, two small thin sticks, such as are used for the purpose of procuring abortion, were found to be armed at one end with a paste containing arsenious oxide. And in the fourth case from Kaira, arsenious oxide formed the contents of a small packet sent for examination by the Civil Surgeon.

12. Of the 4 cases in which compounds of arsenic other than arsenious oxide were detected, 2 at least seem to have been attempts at poisoning. In one of these, from Belgaum, arsenite of copper was found in some cooked rice; and in the other, from Bijápur, some fragments of bread were found to be dusted over in places with arsenite of copper and red lead. Of the 2 cases in which orpiment or yellow sulphide of arsenic was detected, in one, from Gadag (Dhárwár District), this substance formed the contents of a packet sent for examination in an abortion case. Other packets forwarded in the same case contained (1) arsenious oxide, (2) realgar, and (3) sulphate of copper. In the remaining case, from Bársi (Sholápur District), two packets, sent in a case where a woman was accused of poisoning her husband, were found to contain, the one orpiment, and the other sugar mixed with metallic mercury.

13. *Pounded Glass.*—This was detected in 4 cases during the year: in 2 of these, from respectively Mahád (Kolába District) and Háveri (Dhárwár District), it was found in articles of food, *viz.*, in the first mentioned case in some cooked rice, and in the second in some bread. This last case appears to have been an attempt to poison 3 children. In the third case, from Colába, fragments of bangles were found in the vomit of a man, who accused his wife of an attempt to poison him. In the fourth case, from Gadag (Dhárwár District), pounded glass was found in the contents of the stomach of a child who died with symptoms of irritant poisoning after eating some sweetmeat, found also on examination to contain pounded glass. In this last case a second child was similarly attacked, but recovered.

14. *Copper.*—Of the 6 cases in which this metal was detected during the year, 3 were submitted by the Bombay Police. In one of these, sulphate of copper was found in some cooked food, and adhering also to a stone and a board which had been used to pound the poison. The accused was a woman, the wife of the man for whom the food had been cooked; she was tried and convicted before the High Court. In each of the other two Bombay cases, traces of copper were found in articles of food; in both, however, the copper seemed to have been derived accidentally from the cooking vessels employed. Of the remaining 3 cases, in one, from Sátára, copper was detected in food, the case being one of alleged attempt to poison a man; in a second, from Sindgi (Kaládgi District), some sulphate of copper sent for identification had, it was stated, been used for the purpose of procuring abortion; and the sixth and last case was sent from Taloda (Khándesh District), and was one in which a man having died suddenly, a powder used by him as a medicine was forwarded for examination, and found to contain copper.

15. *Other Mineral Poisons.*—Red lead was detected in 3 cases during the year, *viz.*, (1) in a case from Sátára, in which some composition, with which a number of abortion sticks were armed, was found to consist mainly of red lead;

(2) in a case from Ahmednagar in which a substance which had been thrown into a well was found to be red lead; and (3) in a case from Nussirabad in which red lead formed the contents of a packet found in the possession of a man in custody. In one case, from Bágalkot (Kaládgi District), calomel was found to form the contents of a packet discovered in the possession of a woman accused of attempting to poison a man: and in one case from Bombay, nitric acid was found in some stains on a coat, a minute quantity of the same acid was found also in a bottle sent at the same time. This case was one in which a man, a watch-maker, threw a quantity of nitric acid at another man, the result being destruction of one eye. Accused was tried and convicted before the High Court.

16. *Opium.*—Of the 14 cases in which opium was detected during the year, in 13 this drug was found in the viscera of individuals deceased, *viz.*, 6 males and 7 females. In all these cases the poison seems to have been self-administered. Of the 6 male cases the only one requiring special mention is a case from Dharangaon (Khándesh District), in which the suicide was a youth of sixteen. Of the 7 female cases, in one bodily disease and in two beating by husbands formed the motive leading to suicide. One of the 7 (from Násik) may be specially mentioned. In this case deceased was seen during life by a Hospital Assistant, who found her suffering from symptoms of opium poisoning. After death, a *post-mortem* examination of the body was made by the Civil Surgeon, who found rupture both of the liver and spleen, and reported these injuries to be the cause of death. In the single non-fatal case, opium was detected in some alcoholic liquor with which it was alleged, a man tried to poison or drug a woman he was keeping. This case occurred in Bombay. The man accused, was tried and convicted before the High Court.

17. *Dhatura.*—This poison was detected in 5 cases during the year. In each of the 5, individuals were poisoned, and in 1 case there were 2 deaths. A summary of the 5 cases is as follows:— (1) A case from Sánand (Ahmedabad District) in which dhatura seeds were found in the contents of the stomach of each of 2 men who suffered before death from symptoms of dhatura poisoning. (2) A case from Jalgaon (Khándesh District), in which some seeds found in the possession of a woman accused of poisoning 4 men with dhatura, proved on examination to be dhatura seeds. (5) A case from Dákor (Kaira District), in which daturine, the active principle of dhatura, was detected in some food. A portion of this food had been eaten by 4 persons, who thereafter were attacked with symptoms of dhatura poisoning—all recovered. The sufferers in this case were a man, his brother's wife, and 2 servants. (4) A case from Belgaum, in which some dregs taken out of a coffee pot were found to contain daturine. In this case it was reported that a man and his family—number not stated—suffered from symptoms of dhatura poisoning after drinking coffee prepared in the pot from which the dregs had been taken. (5) A case from Karáchi, in which daturine was extracted from some cooked rice. 8 persons, it was reported, had suffered from symptoms of dhatura poisoning after eating some of the rice sent for examination.

18. *Strychnia.*—This poison was detected in 2 cases during the year, from, respectively, Dindori (Násik District) and Ahmednágar. In the first the alkaloid was detected in the vomit of a young man who attempted to commit suicide. The sufferer was the son of a police constable, and the strychnia swallowed by him was a portion of some issued to his father for the purpose of destroying dogs. In the Ahmednagar case, strychnia was detected in some fragments of bread, and also in some powders sent for examination therewith. The history of this case was reported to be as follows. Two boys, aged respectively nine and four, sons of a police constable, abstracted some strychnia powders from their father's bag. Of these they used two in poisoning dogs. Subsequently they appear to have mixed a third with the bread sent for examination, and were about giving this bread to some boys, when they were stopped by the police school-master. The powders sent along with the bread were found hidden under some rubbish in the school-room.

19. *Other Vegetable Poisons.—Cerbera thevetia* (yellow oleander) seeds were identified in 3 cases, *viz.*, (1) in a case from Sátára, in which it was

alleged that 2 persons were poisoned—both, however, recovered; (2) in a case from Bágalkot (Kaládgi District), in which a man accused his sister-in-law of attempting to poison him by putting *cerbera thevetia* seeds in his food; and (3) in a case from Sholápur in which some seeds sent for identification, unaccompanied, however, by any account of the case to which they referred, proved to be *cerbera thevetia* seeds. *Nerium odorum* (sweet-scented oleander) roots were identified in 2 cases during the year, both of them suicidal. In one of the cases, from Párner (Ahmednagar District), the poisoned individual recovered. The other, from Karáchi, terminated fatally. In the fatal case the suicide was stated to have swallowed a quantity of the root powdered bark mixed with water. The symptoms present were reported to be "tonic spasms of the muscles with trismus (lock-jaw) and occasional exacerbations of the spasms, but without convulsive movements, coma, contracted and inactive pupils, and a very slow and distinctly intermitting pulse." After death the lungs, liver, and right side of the heart were found, it was stated, engorged with fluid blood. Lastly, in a case from Násik some root sent for examination were identified as *calotropis gigantea* roots. In this case it was reported that a man died after eating some of these roots. His body, however, was burned before suspicion arose as to the cause of his death.

20. Of the cases in which no poison was detected, 42, equal to 26·4 per cent. of the whole number of human cases sent up to be examined for poison, were cases in which the matters forwarded for examination consisted of the viscera of persons deceased. Last year the corresponding percentage was almost the same, *viz.*, 26·2. As usual, these 42 cases may be divided into three classes, *viz.*, first, cases in which, from the reports forwarded, the balance of evidence appears to be distinctly in favour of death being due to injury or disease; second, cases in which while there is nothing to show that death was due to disease or injury, there is at the same time nothing to show that death was due to poison; and, third, cases to which a certain amount of suspicion of poisoning attaches. Of the 42 cases, 27 belong to the first, 7 to the second, and 8 to the third class. Of the 27 cases of the first class, 15 were cases in which death appears to have been due to disease, *viz.*, cholera 5, apoplexy 4, pneumonia 3, and 1 each fever, hepatitis, and phthisis. 5 were cases of drowning, 1 a case of hanging, 1 a case of death from snake-bite, and 1—in a child—a case of death from scorpion sting. The remaining 4 were cases of death after abortion, most probably not induced by the administration of drugs, as in each of the four the alimentary canal was found to be free from any signs of irritation. The whole of the 7 cases of the second class were cases of sudden death, in which beyond the fact that death occurred suddenly, there was nothing to indicate that the fatal result was due to poison.

21. Of the 8 cases of the third class, one from Karáchi appears from the history to have been a case of fish poisoning. In 3 more, all from the Central Provinces, the symptoms and *post-mortem* appearances reported more or less strongly pointed to death from poison. In 2 of these, however, no portions of the solid viscera of the deceased individuals were forwarded for analysis, and in the third the only portion of the solid viscera forwarded was an extremely small fragment of the liver. Of course under such circumstances it is very possible that death was due to poison, and the failure of detection the result of the omission to forward for analysis a sufficient portion of the solid viscera. 2 more of the 8 cases, both from Broach, were cases of death after abortion, in both of which the *post-mortem* appearances stated to have been present, were to some extent indicative of the administration of an irritant drug. The remaining 2 cases, from respectively Gokák (Belgaum District) and Dhárwár, were like those last-mentioned, cases in which from the *post-mortem* appearances, it is possible that some irritant drug had been administered.

22. The 33 cases in which matters other than viscera were forwarded for examination and in which no poison could be detected, may be grouped as follows:—In 13 the matters forwarded consisted of articles of food. In several of these no one partook of the suspected food, and in the remainder the symptoms following eating the suspected article were trifling, and evidently due to causes other than poisoning. In 12 more the substances sent for examination consisted of powders or portions of plants. In some of these the matters forwarded were distinctly identified as non-poisonous substances, *e. g.*, carbonate of lime, sulphur, pulse grains, and betel leaves. In most of the remainder

the matters forwarded consisted of vegetable powders of unknown composition, sent on trifling grounds of suspicion. Thus in one case 2 powders were sent for examination, because a man accused of murder, stated that he had swallowed powders like those sent, and that the effect of doing so, was to compel him to commit the crime of which he stood charged. In another case a powder sent for examination, was said to have been given to a woman to mix with the food of some men, "in order to make them dumb". In another a man found some portions of vegetable matter in some food he was eating, and thinking they had a suspicious look handed them to the Police. Again, in another a small quantity of a vegetable powder was forwarded with a statement that it had been "found in the chest of the dead body" of a man suspected to have been poisoned by his wife. Of the remaining 8 cases in one the matters forwarded were some of the ashes of the dead body of a child. In another some dry leaves, on which it was alleged food had been served in a case of dhatura poisoning, were sent; and in the remaining 6, matters vomited by individuals were forwarded. Of these 3 were cases of suspected dhatura poisoning, and one a case of alleged attempt to commit suicide by swallowing the powdered bulbs of *urginea indica*. In the other 2 cases, a slight attack of vomiting formed the only ground of suspicion.

23. *Cases of real or alleged Cattle-poisoning.*—84 cases of this class were submitted for examination and report during the year, and in 50 of these poison was detected. Last year the corresponding numbers were 83 cases and 45 detections. So far as can be ascertained from the reports furnished, the 50 cases in which poison was detected included the poisoning of 57 animals, *viz.*, 2 dogs and 55 head of horned cattle. How the above figures compare with those of previous years will be seen from the table below :—

Year.	1881-82.	1882-83.	1883.*	1884.	1885.	1886.	1887.
Number of cases referred	62	70	45	103	101	83	84
Number of detections	39	37	29	58	54	45	50
Animals killed—							
Ahmednagar	1	14	7	8	13	6	16
Belgaum	...	...	...	...	6	3	2
Kaládgi and Bijápur	2	...	3	2	3	4	...
Khándesh	2	3	...	5	3	3	1
Násik	9	10	5	7	3	5	3
Poona	6	8	5	7	9	6	8
Sátára	1	1	9	12	8	4	...
Sholápur	4	4	2	1	6	13	9
Surat	...	...	1	3	6	2	2
Other districts	9	13	8	6	3	9	16
Total animals killed ...	34	53	40	51	60	55	57

* Nine months only.

24. In 13 of the cases in which poison was detected in the viscera of cattle, more than one animal was killed. 5 of these cases, accounting for 25 deaths, came from the Ahmednagar District, 2 each from Poona and Sholápur Districts, and 1 each from Dhárwár, Surat, Neemuch, and Jath. Of the 50 cases in which poison was detected, in 33 arsenious oxide was the only poison found. In 5 more arsenious oxide mixed with other poisonous substances was detected, *viz.*, in 1 case mixed with the sulphides of arsenic and sulphate of copper, in 2 mixed with sulphate of copper only, in 1 with orpiment only, and in 1 with red lead. The seeds of *cerbera thevetia* (yellow oleander) were detected in 9 cases sent from the following districts :—Ahmednagar (3), Bijápur (2), Sátára (2), and Sholápur (2). The remaining 3 cases were (1) a case from Godhra (Panch Maháls) in which some oil proved on examination to be *argemone mexicana* oil; 2 lbs. of this oil was said to have caused the death of a bullock. (2) A case from Neemuch, in which 2 animals were said to have

died from eating oil-cake, a portion of which sent for examination was found to contain *argemone mexicana* seeds; and (3) a Bombay case in which strychnia was found in the viscera of two dogs.

25. *Cases in which articles suspected to be stained with blood or other animal fluids were forwarded for examination.*—39 cases of this class were referred for report during the past year, involving the examination of 87 different articles. Of the 39, 10 were cases in which articles of clothing were forwarded to be examined for stains of spermatic fluid, and the remainder were cases in which various articles were sent to be examined for stains of blood. Of the latter, blood stains were found on the articles forwarded in 19 cases, *viz.*, in 10 on articles of clothing, and in 9 on objects other than articles of clothing. Among the objects other than articles of clothing on which stains of blood were found, were 3 swords, 2 knives, 2 clubs, a hatchet, a mattock, a bill-hook, and several stones. None of the reports furnished with the cases present any special features of medico-legal interest.

Section II.—Potable Waters.

26. Altogether 207 samples of water were examined, as to suitability for potable purposes, during the year. Of these 134 were classed as good. The table attached gives a summary of the results obtained :—

Number.	Station.	Date of Collection.	Source.	Grains per Gallon.		Parts per Million.		Sediment.	Column added by order of Government.	By whom sent, and Remarks.
						Ammonia.				
				Total Solids.	Chlorine.	Free.	Albuminoid.			
1	Abu	May	Well near Pálanpur quarters ...	8·4	1·54	·40	·18		Bad ...	
2	Do.	Do. ...	Well between Colonel Arthur's bungalow and Abu Hotel ...	7·7	1·42	·16	·12		Good ...	
3	Do.	Do. ...	Well near Thugi Jail	16·1	3·10	·53	·20	Scanty, algæ and paramœcia; rotifers also in 2 and 3.	Bad ...	
4	Do.	Do. ...	Well on Dilwa Road	4·9	1·14	·01	·20		Good ...	Secretary, Municipal Committee, Mount Abu. Free ammonia objectionably high in 1, 3, 9, 10 and 11. Nos. 2, 4 and 6 fair.
5	Do.	Do. ...	Well near Cricket Ground ...	11·6	2·31	·21	·16		Bad ...	
6	Do.	Do. ...	Well near R. C. Chapel, &c. ...	7·0	1·54	·11	·10		Good ...	
7	Do.	Do. ...	Well No. 13	7·1	2·45	·37	·14		Bad ...	
8	Do.	Do. ...	Do. 17	12·6	1·54	·19	·14		Do. ...	
9	Do.	Do. ...	Do. 18	8·4	1·68	·32	·16	Abundant, paramœcia, algæ; rotifers also in No. 9.	Do. ...	
10	Do.	Do. ...	Do. 20	10·5	2·24	·59	·08		Do. ...	
11	Do.	Do. ...	Do. 21	14·0	2·80	·10	·28		Do. ...	
12	Do.	December ...	Club well	13·30	2·38	·05	·05		Good ...	Officer in charge Station Hospital, Mount Abu. All three good.
13	Do.	Do. ...	Barrack well No. 23	11·20	2·10	·13	·07	Scanty, paramœcia	Do. ...	
14	Do.	Do. ...	Pálanpur office well	7·70	1·40	·05	·05		Do. ...	
15	Abu Road ...	October ...	Kheralu station well	30·00	21·28	·04	·15	Scanty, paramœcia	Bad ...	Total solids high; see also para. 47.
16	Ahmedabad ...	July ...	Well at Dudheshvar	21·00	3·22	·05	·01	Scanty	Good ...	
17	Do. ...	October ...	Stand pipe at water-works ...	20·00	5·53	·00	·03	Abundant, paramœcia	Do. ...	Secretary, Ahmedabad Municipality.
18	Do. ...	December ...	Stand pipe near Khamasa Chauki	32·00	5·74	·08	·10	Scanty do.	Do. ...	
19	Ahmednagar.	July ...	Aqueduct water used by R. A.	19·60	·98	·03	·03	Scanty	Do. ...	Medical Officer in charge Station Hospital.
20	Do. ...	Do. ...	Do. do. E. I.	19·60	·70	·07	·03	Do. paramœcia	Do. ...	
21	Do. ...	Do. ...	Drinking water, 1st N. I.	18·20	·56	·02	·06	Do.	Do. ...	Medical Officer, 1st Bn. Grenadiers.
22	Do. ...	Do. ...	Washing water, 1st N. I.	17·50	·70	·16	·03	Do. conferve and diatoms	Do. ...	
23	Ajmere ...	December ...	Anasagar Lake, A ...	30·10	9·26	·014	1·04	Abundant monads	Bad ...	Executive Engineer, Rájputána. Albuminoid ammonia exceptionally high in all three.
24	Do. ...	Do. ...	Do. B ...	29·10	9·33	·014	1·22		Do. ...	
25	Do. ...	Do. ...	Do. C ...	29·70	9·24	·014	1·24		Do. ...	
26	Baroda ...	February ...	Pursoli spring	32·2	7·43	·11	·11	Scanty, paramœcia	Good ...	Chief Engineer, Baroda State.
27	Do. ...	June ...	Well in Residency	47·45	6·96	·08	·03	Do. do. and rotifers.	Bad ...	Total solids rather high in No. 27.
28	Do. ...	December ...	Well near Pursoli	30·10	2·03	·13	·19	Abundant, paramœcia	Good ...	
29	Bijápur ...	Do. ...	Anand Mahál	151·20	46·34	·03	·01	Scanty do.	Bad ...	Collector, Bijápur. Total solids high in No. 29.
30	Do. ...	Do. ...	New Arkilla well	34·30	7·03	·13	·07	Do. do.	Good ...	
31	Bombay ...	January ...	Hog Island well	19·2	2·80	·04	·21	Abundant, paramœcia	Do. ...	Executive Engineer, Bombay Defences.
32	Do. ...	August ...	Municipality	...	...	·026	·10		Do. ...	Health Officer. Ammonia results only asked for.
33	Do. ...	December ...	Well at Khambálla Hill	22·10	2·66	·07	·09	Scanty	Do. ...	Well in a private compound.
34	Broach ...	February ...	Step well in Vejalpur	74·2	12·07	·11	·18		Bad ...	Secretary, Broach Municipality. Ammonia results high in No. 36. Total solids high in the others.
35	Do. ...	October ...	Brahmin's well	46·20	11·06	·12	·16		Do. ...	
36	Do. ...	Do. ...	Seranshia's well	65·10	20·27	·11	·14	Scanty, paramœcia	Do. ...	
37	Do. ...	Do. ...	Sunder well	46·90	8·47	·19	·21		Do. ...	
38	Do. ...	Do. ...	Dobra well	30·20	6·74	·04	·24		Do. ...	
39	Bhusával ...	July ...	A well	142·96	13·86	·00	·11	Scanty, vorticella	Bad ...	Municipality through Civil Surgeon. Total solids high in 39 to 41: see also para. 47.
40	Do. ...	Do. ...	B do.	135·10	19·22	·00	·07	Do. monads	Do. ...	
41	Do. ...	Do. ...	C do.	90·30	12·18	·00	·19	Do. paramœcia	Do. ...	
42	Do. ...	Do. ...	Tápti water	16·80	·84	·14	·18	Abundant do.	Good ...	
43	Dáker ...	August ...	Lake Gomti	3·50	1·72	1·96	·29	Do. full of infusoria, some coloured cotton fibres.	Bad ...	Assistant Surgeon. Free ammonia very high.
44	Devlálí ...	June ...	Cattle line well	19·90	1·74	·08	·42	Scanty, diatoms and paramœcia.	Do. ...	Commissariat. Albuminoid ammonia high.
45	Dhulia ...	November ...	Dudargaon Nála	19·60	1·12	·03	·15	Do.	Good ...	Executive Engineer for Irrigation.
46	Hubli ...	August ...	Haneri station well	19·60	8·40	·02	·01	Scanty	Do. ...	Executive Engineer, Southern Maratha Railway.
47	Do. ...	Do. ...	Racchehur station well	23·20	7·00	·07	·04	Do. paramœcia	Do. ...	
48	Jabalpur ...	May ...	Hydrants	5·60	1·4	·04	·13	Do. do.	Do. ...	
49	Do. ...	July ...	Do.	5·60	·28	·17	·15	Do.	Do. ...	Civil Surgeon.
50	Do. ...	Do. ...	Do.	6·30	·28	·03	·11	Do. conferve and paramœcia	Do. ...	
51	Do. ...	Do. ...	Do.	5·60	·28	·03	·07	Do.	Do. ...	
52	Kaira ...	October ...	River Watrak above nála ...	34·30	6·72	·40	·15		Bad ...	Civil Surgeon. Ammonia results high in 52 and 53. Total solids high in 55, 58 and 59.
53	Do. ...	Do. ...	Do. below nála	32·00	6·72	·03	·12		Do. ...	
54	Do. ...	Do. ...	Ahmedabadi sra	25·20	6·93	·05	·14		Good ...	
55	Do. ...	Do. ...	Bari sra	35·20	7·00	·08	·19	Scanty, paramœcia	Do. ...	
56	Do. ...	Do. ...	Somnáth well	60·20	25·2	·29	·13		Bad ...	
57	Do. ...	Do. ...	Gora Desai well	23·10	5·60	·09	·13		Good ...	
58	Do. ...	Do. ...	Kachia well	197·10	58·10	·29	·14		Bad ...	
59	Do. ...	Do. ...	Nimma well	322·40	119·80	·32	·14		Do. ...	

Number.	Station.	Date of Collection.	Source.	Grain per Gallon.		Parts per Million.		Sediment.	Column added by order of Government.	By whom sent, and Remarks.
				Total Solids.	Chlorine.	Ammonia. Free.	Ammonia. Albumenoid.			
60	Karáchi	November	Malir River	29·40	10·85	·00	·14	Scanty, paramecia	Good	Municipality.
61	Khandva	March	Barrack well	28·7	·98	·02	·06	Do. do.	Do.	Sanitary Commissioner, Bombay.
62	Do.	Do.	4 block filter	28·0	1·82	·02	·15	Do. do.	Do.	
63	Do.	Do.	Town water	22·4	1·12	·08	·01	Abundant, paramecia	Do.	
64	Do.	Do.	Railway station water	40·6	4·90	·03	·12	Scanty, rotifers	Bad	
65	Khárághoda	January	New tank	56·7	28·84	·20	·22	Abundant, diatoms and rotifers	Do.	Executive Engineer for Irrigation. Solids and chlorides high in all, except 66 and 68. Ammonia results very high in 67 and 68.
66	Do.	April	Kutcha well	26·6	3·99	·08	·77	Scanty	Good	
67	Do.	Do.	Well, Sádra tank	184·1	77·00	1·12	·07	Abundant	Bad	
68	Do.	Do.	Well near Vokla	32·9	10·50	·96	·24	Scanty, paramecia	Do.	
69	Do.	Do.	New well	86·10	37·80	·21	·15	Do.	Do.	
70	Do.	May	Well in tank	100·1	49·70	·08	·40	Abundant, paramecia	Do.	
71	Kirkee	Do.	Well near Bopkhel	18·2	·98	·08	·12	Scanty, monads and paramecia	Good	Medical Officer, Station Hospital. Albumenoid ammonia high in No. 72.
72	Do.	Do.	Well near Boshri	18·2	1·26	·09	·36	Abundant do.	Bad	
73	Do.	Do.	Well	17·5	·84	·00	·15	Scanty, vorticella, paramecia, rotifers.	Good	
74	Do.	June	Well east of Bhorsi camp	19·60	·91	·16	·14	Abundant, confervæ, paramecia	Do.	
75	Do.	July	Followers' lines	9·80	·77	·02	·17	Scanty, confervæ and monads.	Do.	
76	Do.	Do.	Pashan Valley	7·70	·77	·0	·12		Do.	
77	Do.	August	Khadakvásla supply	2·10	·49	·04	·03	Do. paramecia	Do.	Medical Officer, Sappers and Miners.
78	Loralai	February	Karez	38·5	4·06	·04	·07	Scanty	Do.	Medical Officer, 10th N. I.
79	Do.	June	Water-course	17·50	1·61	·00	·02	Do. diatoms and monads	Do.	
80	Málegaon	April	Arsenal well	28·0	·98	·08	·10	Do. paramecia	Do.	Staff Surgeon, Málegaon. 81 to 88, from sites of proposed cholera camps.
81	Do.	June	Depôt well near	22·40	·98	·08	·09	Do. do. confervæ and diatoms.	Do.	
82	Do.	Do.	Quarter Guard well	26·60	1·61	·14	·12	Do. algæ	Do.	
83	Do.	Do.	Store Room well	23·10	·84	·07	·06	Do. diatoms, confervæ and paramecia.	Do.	
84	Do.	Do.	Girls' School well	26·60	2·73	·00	·09		Do.	
85	Do.	August	Solgaom well	47·60	10 78	·07	·09	Do. do.	Do.	
86	Do.	Do.	Girna River	5·60	1·40	·00	·03		Do.	
87	Do.	Do.	Stream at Dahardi	16·80	2·10	·01	·23	Abundant, paramecia	Do.	
88	Do.	Do.	Mosum River	28·70	3·78	·05	·10		Do.	
89	Mhow	December	Soda water	16·80	1·05	·01	·08	*Nil*	Do.	Superintendent of Police, Kolába.
90	Nágothna	Do.	Well, Sukeli	18·20	0·84	·04	·07	Scanty, paramecia	Do.	
91	Nágpur	February	Public stand pipe	4·9	·42	·03	·13		Do.	Executive Engineer, Nágpur Water Works.
92	Do.	Do.	Private service pipe	7·7	·42	·00	·08	Scanty, paramecia	Do.	
93	Do.	Do.	Ambagery Reservoir	4·9	·35	·05	·12		Do.	
94	Do.	Do.	Telenkhery tank	8·4	·35	·13	·24		Do.	
95	Násik	March	Wesobá tank	4·2	·70	·00	·46	Scanty	Bad	Collector of Násik. Albumenoid ammonia high in all three.
96	Do.	Do.	Ketki well	8·4	1·19	·00	·40	Do. monads	Do.	
97	Do.	Do.	Thakur well	7·0	·70	·16	·42	Abundant, radiolaria	Do.	
98	Nasirabad	July	New well near Dánta	58·80	14·70	·06	·03	Very scanty	Do.	Executive Engineer, Rájputána. Ammonia results high in 100, 101, 105, 108 and 109, and very high in 102. Solids high in 98, 102, 103 and 106.
99	Do.	Do.	Dilwára well	24·50	3·50	·19	·12	Do. paramecia	Good	
100	Do.	Do.	Bázzár Diggie	6·30	·63	·48	·64	Scanty, monads and paramecia	Bad	
101	Do.	Do.	Juláni Khudda	15·40	2·66	1·12	·70	Do. paramecia	Do.	
102	Do.	Do.	Cattle pond near Khudda	61·60	14·98	6·72	2·50	Abundant, monads and bacteria	Do.	
103	Do.	August	Villagers' well, Dánta	53·90	13·58	·13	·14	Scanty	Do.	
104	Do.	Do.	Dilwára well	23·80	2·80	·07	06	Do.	Good	
105	Do.	October	Bhir tank	21·00	4·06	·21	·44	Scanty, paramecia and rotifers	Bad	
106	Do.	Do.	Jamnu tree well	59·50	14·84	·07	·05	Do. do.	Do.	
107	Do.	Do.	Dilwára well	32·20	4·90	·04	·05	Do.	Good	
108	Do.	November	Dánta water, storage tank	7·20	1·40	·01	·30	Do. paramecia	Bad	
109	Do.	Do.	Bhir water, filtered	18·20	5·25	·16	·40	Do. do.	Do.	
110	Neemuch	April	Well No. 8	28·00	2·10	·11	·06	Do. do.	Good	Medical Officer, Station Hospital: see also paragraph 47.
111	Do.	Do.	Well No. 12	22·4	1·54	·08	·03	Do. do.	Do.	
112	Poona	July	Khadakvásla pipe, Wánowri	2·80	·56	·04	·06	Do.	Do.	Medical Officer, Station Hospital.
113	Do.	Do.	Do. Ghorpuri	2·80	·56	·02	·03	Do.	Do.	
114	Do.	August	Ghorpori north well	29·40	1·68	1·12	·28	Do.	Bad	Secretary, Cantonment Committee. Ammonia results high in No. 114.
115	Do.	Do.	Do. south well	22·40	·70	·12	·07	Do.	Good	
116	Do.	Do.	Scindia's Chatri well	37·80	3·08	·15	·08	Do. paramecia	Do.	
117	Do.	Do	Wánowri south well	28·70	1·47	·16	·15	Do. diatoms and paramecia	Do.	
118	Do.	Do.	Do. north well	20·30	3·15	·12	·13	Do. paramecia	Do.	
119	Do.	Do.	Do. east well	17·50	2·80	·11	·07	Do. do.	Do.	
120	Do.	November	Holkar's tank	22·40	3·50	·15	·26	Do. monads	Do.	Deputy Sanitary Commissioner.
121	Do.	Do.	Cistern after filtration	21·00	3·43	·08	·24	Do. do.	Do.	
122	Do.	December	River below Bund	20·30	1·12	·13	·14	Do. confervæ and paramecia	Do.	Medical Officer Station Hospital. Free ammonia high in No. 124.
123	Do.	Do.	Do. at Boat Club	17·50	1·05	·21	·11		Do.	
124	Do.	Do.	Do. at the Sungum	15·40	1·12	·69	·17	Abundant, paramecia, rotifers	Bad	
125	Do.	Do.	Do. at Holkár's bridge	13·30	0·70	·09	·09	Scanty	Good	
126	Do.	Do.	Do. near railway bridge	16·10	0·84	·07	·08	Do. monads	Do.	
127	Do.	Do.	Do. at bathing ghát	16·10	0·84	·24	·10	Do. do.	Do.	
128	Pandharpur	November	Tank, unfiltered	13·30	2·10	·37	·52	Do. paramecia, rotifers	Bad	Medical Officer, Station Hospital.
129	Do.	Do.	Do. filtered	15·40	2·10	·19	·46	Do. do.	Do.	
130	Do.	Do.	Pipe near burial-ground	15·40	2·03	·19	·38	Do. do.	Do.	
131	Do.	Do.	Bhima River	9·10	1·05	·03	·11	Abundant, monads	Good	Assistant Surgeon. Ammonia results high in all, except 124.
132	Purandhar	July	No. 1 covered well	9·10	·84	·04	·07	Very scanty, paramecia	Do.	
133	Do.	Do.	No. 2 do.	4·90	·63	·05	·09	Scanty do.	Do.	
134	Do.	Do.	No. 3 do.	14·00	1·12	·05	·05	Abundant, monads	Do.	
135	Quetta	December	Proposed supply	21·00	2·38	·05	·14	Scanty, paramecia	Do.	Executive Engineer Proposed supply of Quetta.
136	Raipur	May	Bhorrah tank	13·3	1·68	·08	·63	Scanty, monads and paramecia.	Bad	Civil Surgeon. Ammonia results high in all; albumenoid ammonia extremely high in 137.
137	Do.	December	Sagari tank	28·00	3·22	·03	8·26	Do. paramecia	Do.	
138	Do.	Do.	Bhimsáni tank	10·50	1·33	·72	·30	Do. do.	Do.	
139	Sávda	April	Mussalman's well	47·6	7·42	·05	·10	Do. do.	Do.	Municipality. Total solids rather high.
140	Do.	Do.	Market well	50·4	4·34	·08	·20	Do. do.	Do.	
141	Sátára	May	Well, 22nd N. I. Hospital	23·8	3·08	·08	·52	Do. diatoms and paramecia.	Do.	
142	Do.	Do.	Well, Quarter Guard	22·4	2·24	·00	·08	Do. diatoms, paramecia and rotifers.	Good	
143	Do.	Do.	Well, cow's store	23·1	2·94	·00	·09	Do. confervæ and paramecia.	Do.	Medical Officer, Station Hospital. Albumenoid ammonia high in 141, 144, 145, and 149, and very high in 150.
144	Do.	Do.	Well in connection with Dood Talao tank.	18·2	2·10	·00	·44	Abundant, paramecia	Bad	
145	Do.	Do.	Well, centre of Lines, 22nd N. I.	39·2	9·52	·02	·58	Do. diatoms and paramecia.	Do.	
146	Do.	Do.	Well, Station Hospital	26·6	1·40	·00	·08	Scanty, diatoms and monads	Good	
147	Do.	Do.	Well, front of Mess, 22nd N. I.	32·9	4·34	·00	·10	Do. do.	Do.	
148	Do.	Do.	Well, Quarter Guard	23·1	2·80	·00	·23	Do. do.	Do.	
149	Do.	Do.	Tank No. 5, Fort	15·4	1·68	·32	·56	Abundant, monads	Bad	
150	Do.	Do.	Tank, Mangali Fort	19·6	1·82	·16	1·22	Do. and algæ	Do.	
151	Do.	Do.	Dood Tank No. 5.	9·8	1·68	·02	·16	Abundant, paramecia	Good	Medical Officer, Station Hospital, Sátára.
152	Do.	Do.	Do.	32·2	2·38	·08	·05	Scanty do.	Do.	
153	Do.	September	Well in Rája's garden near Quarter Guard.	23·80	1·89	·01	·05	Do. do.	Do.	
154	Do.	Do.	Do. in front of Hospital	32·20	2·03	·01	·05	Do. do.	Do.	
155	Do.	Do.	Do. do. of Quarter Guard	30·80	2·10	·01	·05	Do. do.	Do.	
156	Do.	Do.	Do. in centre of lines	37·10	8·40	·03	·08	Do. do.	Do.	
157	Do.	Do.	Tank, "Musjid", Fort	31·50	0·98	·03	·13	Abundant, diatoms, confervæ, paramecia.	Do.	

Number.	Station.	Date of Collection.	Source.	Grain per Gallon.		Parts per Million.		Sediment.	Column added by order of Government.	By whom sent, and Remarks
				Total Solids.	Chlorine.	Ammonia. Free.	Ammonia. Albuminoid.			
158	Sátára ...	September ...	Mahádev tank, Fort	16·10	0·98	·04	·21	Abundant, monads	Good ...	
159	Do. ...	Do. ...	Machika Talao, Fort... ...	16·80	0·98	·03	·09	Do. paramecia	Do. ...	
160	Do. ...	Do. ...	Tank near pipul tree, Fort ...	14·30	1·12	·00	·21	Do. actinophrys	Do. ...	
161	Do. ...	Do. ...	Well, Dood Talao, Fort	9·80	0·70	·00	·06	Scanty, paramecia	Do. ...	
162	Do. ...	Do. ...	Dood Talao, Fort	10·50	0·91	·08	·16	Abundant	Do. ...	
163	Do. ...	Do. ...	Sin Sagar tank, Fort	17·50	1·75	·03	·60	Scanty, diatoms and paramecia.	Bad ...	
164	Do. ...	Do. ...	Mangalai tank, Fort	5·60	0·70	·00	·10	Do. rotifers and do. ...	Good ...	Medical Officer, Station Hospital, Sátára. 165 to 176 from sites of various cholera camps. Albumenoid ammonia high in No. 163.
165	Do. ...	Do. ...	Well near Gadoli tank	22·40	·98	·01	·05	Do. do. do. ...	Do. ...	
166	Do. ...	Do. ...	Gadoli tank	21·00	·70	·01	·07	Do. paramecia	Do. ...	
167	Do. ...	Do. ...	Well No. 2 near do.	23·80	1·40	·00	·05	Do. do.	Do. ...	
168	Do. ...	Do. ...	Well in village Kodoli, 1st site...	28·70	1·54	·03	·04	Do. do.	Do. ...	
169	Do. ...	Do. ...	Do. do. 2nd site .	17·50	1·12	·21	·04	Do. do.	Do. ...	
170	Do. ...	Do. ...	Tukárám Jadu's well in 3rd site.	26·60	1·54	·04	·08	Abundant, confervæ, paramecia.	Do. ...	
171	Do. ...	Do. ...	Naro Londia's well in 3rd site ...	17·50	·98	·00	·06	Do.	Do. ...	
172	Do. ...	Do. ...	Well No. 1, left side of Camp, 1st site.	26·60	1·26	·00	·06	Scanty	Do. ...	
173	Do. ...	Do. ...	Well No. 2, right side do. ...	25·20	1·26	·00	·02	Do.	Do. ...	
174	Do. ...	Do. ...	Urmodi, 1st site	7·00	·84	·00	·03	Abundant	Do. ...	
175	Do. ...	Do. ...	Pondia well Kondwa, 2nd site ...	36·40	3·36	·00	·05	Scanty, confervæ and paramecia.	Do. ...	
176	Do. ...	Do. ...	Choudan well do. do. ...	22·40	1·40	·01	·02	Do. paramecia	Do. ...	
177	Sávantvádi ...	June ...	Hot spring	4·90	·70	·00	·18	Do. monads, paramecia ...	Do. ...	Political Officer. Reputed to cure skin diseases.
178	Secunderabad	December ...	Well in Brigadier's compound...	63·00	18·90	·04	·13	Abundant, monads	Bad ...	Executive Engineer. Solids high, especially in No. 180.
179	Do. ...	Do. ...	Subadár Thánderáo's well ...	47·70	50·40	·03	·16	Scanty, paramecia	Do. ...	
180	Do. ...	Do. ...	Well in R. C. Church compound	79·80	21·70	·09	·12	Abundant, diatoms, paramecia..	Do. ...	
181	Shiwani ...	March ...	River	56·0	12·95	·88	·90	Do. do. ...	Do. ...	Chief Engineer, Southern Marátha Railway. Ammonia results high in 181.
182	Do. ...	Do. ...	Nála at Veráppur	4·34	13·09	·00	·11	Scanty do. ...	Good ...	
183	Do. ...	Do. ...	Well at Bandre	32·2	3·15	·00	·14	Do. ...	Do. ...	
184	Sirdárpur ...	June ...	Cemetery spring	18·20	·70	·05	·08	Abundant, paramecia	Do. ...	Medical Officer, Bhopawar Agency.
185	Do. ...	Do. ...	Spring, river Mya	21·10	1·26	·00	·01	Do.	Do. ...	
186	Sirúr ...	August ...	Preparatory Camp, Dhoble Nála.	21·70	3·71	·04	·09	Scanty, confervæ, paramecia ...	Do. ...	
187	Do. ...	Do. ...	Do. well A ...	36·40	9·03	·00	·05	Do. monads	Do. ...	
188	Do. ...	Do. ...	Do do. B ...	35·70	5·46	·03	·05	Do. diatoms and paramecia.	Do. ...	
189	Do. ...	Do. ...	Do. do. C ...	35·70	5·04	·01	·05	Do. paramecia	Do. ...	
190	Do. ...	Do. ...	Old Sirúr Camp, Ghod river ...	2·10	·56	·00	·06	Abundant	Do. ...	
191	Do. ...	Do. ...	Old well A	42·00	5·18	·03	·11	Scanty, paramecia	Do. ...	
192	Do. ...	Do. ...	Bulegan Camp, Dudh Nála ...	11·90	1·96	·04	·07	Do. monads and diatoms ...	Do. ...	Medical Officer, Poona Horse. All from various sites for proposed cholera camps.
193	Do. ...	Do. ...	Do. well A	19·60	1·47	·03	·08	Do. paramecia	Do. ...	
194	Do. ...	Do. ...	Do. do. B	9·80	1·05	·04	·06	Do. do.	Do. ...	
195	Do. ...	Do. ...	Do. do. C	18·90	2·66	·04	·06	Do. do.	Do. ...	
196	Do. ...	Do. ...	Jowla Camp, Sideshwar Nála ...	12·60	3·78	·00	·05	Do. diatoms	Do. ...	
197	Do. ...	Do. ...	Do. well A	26·60	3·22	·01	·07	Do.	Do. ...	
198	Do. ...	Do. ...	Do. ,, B	18·20	3·01	·01	·04	Do.	Do. ...	
199	Do. ...	Do. ...	Do. ,, C	27·30	3·50	·01	·06	Do.	Do. ...	
200	Do. ...	Do. ...	Do. ,, D	30·10	3·08	·04	·11	Do.	Do. ...	
201	Do. ...	September ...	Old Sirúr Camp well B	28·00	2·66	·08	·07	Do. paramecia	Do. ...	
202	Do. ...	December ...	Poona Horse Mosque well ...	40·20	13·44	·04	·14	Do. do.	Bad ...	Commandant, Poona Horse. Solids rather high.
203	Surat ...	May ...	.....	81·9	21·56	·11	·16	Abundant, monads, paramecia...	Do. ...	Civil Surgeon. Solids high.
204	Do. ...	Do. ...	.....	65·1	18·20	·11	·12	Do. do. do. ...	Do. ...	
205	Thána ...	December ...	Pokran tank	8·40	0·98	·03	·15	Do. confervæ, paramecia.	Good ...	Used by prisoners in District Jail.
206	Vishnagar ...	January ...	Old well	65·10	14·28	·04	·05	Do. paramecia, rotifers...	Bad ...	Executive Engineer, Rájputána Málwa Railway. Solids high, especially in 207.
207	Do. ...	Do. ...	New well	156·80	59·50	·22	·18	Do. monads	Do. ...	

Section III.—Government Stores.

27. The articles coming under this description, examined during the past year, comprised :—

Commissariat Stores.

Samples of malt liquor	...	...	...	67
,, lime-juice	...	...	...	92
,, tea ...	...	...	...	22
,, sugar	...	...	...	21
,, sundry articles of food		...	...	11
,, wines	...	...	...	3
,, soap	...	...	...	36
,, disinfectants and sundries		...	...	12
			—	264

Ordnance and other Stores.

Samples of mercuric fulminate		...	...	47
,, metals and alloys		...	...	5
,, sundry stores ...		...	...	39
			—	91
				355

28. *Malt Liquor.*—Of the 67 samples of malt liquor examined during the year under report, 20 were samples from two consignments of porter and ale, imported by Government for the use of troops. These 20 samples were, as

usual, taken—2 per cask—from 10 hogsheads, *viz.*, 4 of ale and 6 of porter; one sample being drawn on arrival of the consignment, and the other six days after landing it. The table below shows the results obtained on examination of the second-drawn sample from each cask:—

Brewery Number.	Description of Liquor.	Extract Gravity.	Beer Gravity.	Original Gravity.	Alcohol by Volume, per Cent.	Acidity as Hydrated Acetic Acid, per Cent.
1 ...	Ale ...	1017·6	1008·4	1058·6	6·56	·28
„ ...	Do. ...	1018·0	1009·1	1057·4	6·33	·30
„ ...	Do. ...	1013·0	1003·0	1057·9	7·18	·26
„ ...	Do. ...	1013·4	1003·4	1058·3	7·18	·22
„ ...	Porter ...	1017·3	1008·0	1058·8	6·64	·27
„ ...	Do. ...	1018·5	1009·4	1059·0	6·49	·26
2 ...	Do. ...	1016·9	1008·1	1055·7	6·25	·50
„ ...	Do. ...	1016·6	1007·5	1057·1	6·49	·38
„ ...	Do. ...	1017·2	1007·8	1059·2	6·72	·35
„ ...	Do. ...	1016·8	1007·3	1059·3	6·80	·35

29. *Malt Liquor—continued.*—9 more of the samples were samples of porter brewed by the Deccan Brewery Company, and forwarded by the Commissariat Department for examination. 4 of these, more fully examined than the others, gave the following results:—

	1	2	3	4
Extract gravity	1030·2	1026·3	1029·0	1026·6
Distillate gravity	991·4	991·1	991·7	991·1
Original gravity, D. M.	1067·2	1064·9	1059·2	1065·2
Alcohol by volume, per cent ...	6·09	6·33	5·87	6·33
Acidity as hydrated acetic acid, per cent...	·43	·36	·41	·42
Extract, per cent	8·80	7·51	8·39	7·66

Of the remaining samples one was a sample of porter from the canteen of the East Yorkshire Regiment at Colába, forwarded by the Officer commanding the Regiment, watering being suspected. On examination, however, no evidence could be obtained of this, the sample showing an original gravity of 1055·5. The other 37 samples were all samples from casks of malt liquor imported by Government, which had been condemned at various stations by committees. 34 of these were sent from Karáchi, 2 from Hyderabad, Sind, and 1 from Bombay. Many of these were very sour, and more or less decomposed. Of the 37, in 11 the acidity was over 1·0 per cent., in 10 over ·60 and under 1·0 per cent., in 15 between ·60 and ·50 per cent., and in 1 only under ·50 per cent.

30. *Lime-juice.*—The whole of the 92 samples of this article examined during the year were submitted by the Commissariat Department. Of the 92, 5 were fortified samples, all of which proved to be of good quality. The remainder were all samples of raw lime-juice tendered by contractors. Of these only 4 had to be rejected—2 on account of excessive turbidity, and 2 on account of low strength. While on the subject of lime-juice I may mention that towards the end of last year I was consulted by the Commissary General of the Army as to the possibility of substituting for lime-juice, some more portable antiscorbutic, *e.g.*, tamarinds, amchur, or kokum. On consideration, however, it appeared to me that instead of substituting any of the antiscorbutics named, a better plan would be to employ concentrated lime-juice. As the result of some experiments made in the matter, I found that concentrated fortified lime-juice could be readily prepared five times the strength of the unconcentrated article; and I prepared and submitted to the Commissariat Department a sample of concentrated fortified lime-juice of the strength stated.

Lime-juice, concentrated to this extent, is a fairly thin liquid, only requiring dilution with four volumes of water, to be at once fit for issue. Obviously, its substitution for the unconcentrated article is equal to a saving of carriage to the extent of four-fifths—a very much greater saving than could be effected by the substitution of any of the other antiscorbutics referred to.

31. *Tea.*—The 22 samples of tea examined during the year were all samples of supplies tendered by contractors to the Commissariat Department. Of the 22, 3 were rejected for inferiority of quality. The average results obtained from the 19 accepted samples were as follows :—

Specific gravity of a 10 per cent. decoction ...	1010·2
Soluble ash, per cent.	3·44
Insoluble do.	2·64
Total ash, per cent.	6·08

32. *Sugar and Sundry Articles of Food.*—21 samples of sugar were examined during the year on behalf of the Commissariat Department. Of the 21 samples, 7 had to be reported on unfavourably, and 14 were passed. 4 samples of Indian made arrowroot were examined, all of which proved to be samples of "Maranta" arrowroot of good quality. The remaining 7 samples comprised 4 samples of ghee, of which one proved to be largely adulterated with foreign fat; 2 samples of pearl barley, both found to be whitened with chalk; and 1 sample of essence of vinegar, which on examination proved to be concentrated acetic acid.

33. *Wines.*—The 3 samples of wine examined for the Commissariat Department comprised 2 samples of Tarragona wine for hospital use, sent respectively from Jabalpur and Mhow; and 1 sample of portwine from Jabalpur, also intended for use in hospitals. Of these the Jabalpur sample of Tarragona wine gave the results per cent. shown below under (1), and the portwine those shown under (2). The Mhow sample of Tarragona wine was similar in quality to the Jabalpur sample:—

	(1)	(2)
Alcohol by volume	20·07	20·82
Volatile acid as acetic acid	·14	·05
Fixed acid as tartaric acid	·45	·17
Extractive	15·78	8·64
Ash	...	3·8

34. *Soaps.*—The 36 samples of soap examined for the Commissariat Department during the year included 22 samples of bar soap, 10 samples of soft soap, and 4 samples of carbolic acid soap. In the 22 samples of bar soap the percentage of water ranged from 40·7 to 68·2 per cent., with an average of 48·9 per cent. The percentage of water in the 10 samples of soft soap ranged from 29·1 to 42·5, and averaged 36·8; and all 4 samples of carbolic soap contained under 26 per cent. of water, the driest containing only 19·8 per cent.

35. *Disinfectants and Sundries.*—The 12 samples coming under this head consisted of 7 samples of disinfecting powder, 3 samples of kerosine oil, and 2 samples of insect powder. Of these the whole of the samples of disinfecting powder were found to be of the quality required by the terms of the Commissariat contract, *viz.*, Calvert's disinfecting powder containing over 10 per cent. of carbolic acid. All 3 samples of kerosine oil also were found to be of the required quality, *viz.*, to have a flashing point of over 77° F (Abel). The 2 samples of insect powder also were apparently of good quality.

36. *Ordnance Stores.*—47 samples of mercuric fulminate were qualitatively examined for the Small Arms Ammunition Factory, Kirkee. All were samples made in the factory, and all on examination were found to be free from acidity, and apparently of good quality. For the same factory also 5 samples of metal were examined, *viz.*, 3 of block tin, all of which were found practically pure, and 2 samples of lead alloyed with tin, which on examination were found to contain, respectively, 7·93, and 7·99 per cent. of the latter metal. Lastly, for the

same factory the following samples of miscellaneous stores were examined. 9 samples of sulphide of antimony, of which 4 were found to be adulterated with sulphide of lead. 7 samples of bees' wax, of which 3 were reported on unfavourably. 6 samples of rectified spirit, 3 of shellac, 1 of soft soap, and 1 of sulphuric acid, all of which were found to be of good quality.

37. *Ordnance Stores—continued.*—In addition to the samples enumerated in the preceding paragraph, as examined for the Small Arms Ammunition Factory, the following samples of stores were examined for other branches of the Ordnance Department :—4 samples of neat's foot oil, 2 of which were found largely adulterated with other oils. One sample of cocoanut oil, which on examination proved to be free from adulteration. One sample of damaged tent chintz, one of insect powder, and one of gunpowder. This last, a specimen of gunpowder in large prisms, was forwarded by the Superintendent of the Kirkee Powder Factory, in order that the percentage of carbon and hydrogen present in the charcoal might be determined. On analysis the charcoal was found to yield carbon 55·80 and hydrogen 5·00 per cent.

38. *Other Government Stores.*—A sample of linseed oil was examined at the request of the Collector of Colába, the question being whether the sample was one of raw or of boiled oil. On examination it proved to be of the latter description. A sample of bichromate of potash was examined for the Government Telegraph Stores, and proved to be of good quality. Lastly, a sample of chloroform and a sample of milk were examined at the request of the First Physician, Jamsetji Jijibhoy Hospital. The chloroform turned out to be pure, and the milk, a sample of a day's supply for the hospital, gave the following results :—specific gravity 1028, fat 5·18 per cent., solids not fat 10·97 per cent., ash ·64 per cent.

Section IV.—Customs and A'bka'ri Analyses.

39. During the year under report, 652 samples of various substances were examined for Customs and Ábkári purposes. These comprised :—

Samples of imported potable spirits	...	181
„ other imported supposed alcoholic liquids	...	53
„ country liquor	...	10
„ opium	...	21
„ explosives and sundries ...	...	22
„ petroleum	...	365
Total	...	652

40. *Imported Potable Spirits.*—The 181 samples coming under this head, hiefly samples of brandy and whisky, were nearly all examined during the three months ending June 1887. All were sent by the Bombay Customs for the purpose of having their real alcoholic strength ascertained ; the provisions of the New Tariff Act, introduced early last year, rendering it necessary that this should be done in the case of all imports of such liquids. The large number of samples which were being forwarded, led to a correspondence with the Commissioner of Customs, the result of which was that three of the senior members of the staff of gaugers of the Bombay Customs were deputed to attend at the Chemical Analyser's laboratory to receive instruction in alcoholometry, and the requisite apparatus having been obtained, the work is now conducted in all ordinary cases by the Customs Staff.

41. *Other imported supposed alcoholic liquids.*—The 53 samples of this class consisted of 42 samples of medicinal preparations, 3 samples of perfumes, 2 samples of methylic alcohol, and 6 samples of methylated spirits. Of the liquids forwarded as medicinal preparations, one proved to be a sample of nearly pure dilute spirit 22·3 per cent. under proof, 6 were found free from alcohol, 4 were found to contain under 10 per cent. of proof spirit, 20 between 10 and 50 per cent. of proof spirit, and 11 over 50 per cent. of proof spirit. One of these last, it may be noted, was a sample of ginger ale essence.

42. *Country Liquor.*—Of the 10 samples of country liquor examined during the year, 4 were submitted by the Supervisor, Uran Distilleries. These were

sent, in order that their alcoholic strength might be verified by this Department. Two more of the samples were sent by the First Assistant Collector, Khándesh. Of these one was taken from a cask in a liquor-vendor's shop, and the other was said to be a specimen of the same liquor after straining through cloth. Of the two, the first-mentioned specimen was bright green in colour, and contained suspended in it numerous minute particles of a compound of copper. The second sample also contained copper, but to a less extent than the first. The remaining 4 samples were sent by the Collector of Kánara. These, like the Khándesh samples, appear to have been obtained from the shop of a liquor-vendor, and were sent on account of a "general complaint from the consumers of the liquor, that it caused nausea." Of the 4 samples, 2 were stated to have been redistilled, the vendor alleging that he only sold redistilled liquor to his customers. All 4 samples were found to contain copper, the amount being less in the alleged redistilled samples than in the others.

43. *Opium.*—During the year, 19 samples of crude opium were forwarded to this office for examination as to quality and presence or absence of arsenic. Of these 13 were sent from Násik and 6 from Kaira. All were found free from arsenic, an adulterant which in the form of realgar, was last year detected in 2 samples from Násik (see this Office Report for 1886, paragraph 54). Of the 13 Násik samples, 3 were found more or less adulterated with foreign vegetable matters containing starch, and 2 of the 6 Kaira samples showed traces of a similar adulteration. All the others were of good quality. One sample of chandul was forwarded from Násik, and was found to be free from foreign noxious matters; and, lastly, a sample of a substance sent by the Magistrate of Párner, and which was suspected to contain opium, was on examination found to be free therefrom.

44. *Explosives and Sundries.*—The 22 samples included under this head consisted of (*a*) 18 samples of dynamite from 3 consignments of, respectively, 400, 371, and 400 cases. All were found to be, as required by the Explosives Act, free from exudation, and to pass the heat test; (*b*) a sample of a substance seized by the Customs authorities as contraband salt. The substance in question was declared to be "potash", but on examination proved to be common salt. (*c*) A sample of bark sent from Belgaum said to be employed in distilling country liquor. This proved to be a specimen of the bark of *acacia leucophloea* (Vern. *hewur*). As mentioned in this office report for 1885, paragraph 60, this bark is used on account of the tannic acid it contains, for the purpose of coagulating the albuminous matters present in the juices from which liquor is distilled. (*d*) A sample of liquid forwarded by the Civil Surgeon, Ellichpur, in a case of an alleged breach of the Abkári regulations. This liquid was supposed to be alcoholic, but on examination was found to be free from spirit; and (*e*) a sample of discoloured spirits forwarded by the Revenue Commissioner, N. D., to be examined for noxious matters, from which, however, it was found to be free.

45. *Petroleum.*—During the past year, 20 petroleum-laden ships arrived in Bombay Harbour, 9 bringing Russian oil from Batoum, and 12 bringing American oil. From these cargoes altogether 310 samples were examined under the provisions of the Petroleum Act. In addition, 14 samples from a cargo, which arrived from America late in 1886, and 6 samples from two other small consignments of burning oil were examined, making altogether 360 samples. All the consignments above referred to were found to possess a flashing point above the legal minimum. In 7 of the Russian cargoes no sample was found flashing lower than 78° F., and in the remaining 2 no sample was found flashing under 76° F. In 4 only of the American cargoes no sample was found flashing under 78° F., and in none of the American cargoes was any sample found flashing under 75° F. The 5 remaining samples were—(*a*) 3 samples from two consignments of respectively 8 casks, and 50 casks of crude petroleum from Rangoon, all of which were found not to flash below the legal minimum; (*b*) a single sample from a small consignment of petroleum which was found to have a flashing point of 78° F.; and (*c*) one sample of "American burning naphtha", which was found to take fire and burn continuously even at a temperature below 30° F. In the case, therefore, of this sample, an interval of eight degrees F., between "the temperature at which the testing is commenced" and the flash (see Schedule Act XII of 1886, III, 4, clause 4), could not be obtained.

Section V—Miscellaneous.

46. The 52 examinations coming under this head comprised—

Samples of water	15
„ ghee, flour, &c.	18
„ sundry substances	19
Total ...	52

47. *Water.*—15 samples of water intended for other than potable purposes were examined during the year, with the results shown under Nos. 1 to 15 in the table below: of these Nos. 1 to 8 were forwarded by various railway authorities to be examined as to their fitness or otherwise for use in the boilers of locomotives; Nos. 9 to 14 were forwarded by the Political Agent, Cutch, and were intented for irrigation use; and No. 15 was forwarded by the Commissary General, the question being in regard to its fitness for use in the boilers of the Aden Bakery. Analyses Nos. 16 to 21 show the results of the further examination of 6 samples of potable water referred to in Section II of this report.

No.	Forwarded by	Source.	Total Solids.	Chlorine.	Grains per Gallon		Magnesia.	Silicic Acid.
					Sulphuric Acid.	Lime.		
1	R.-M. Railway ...	Wadnagar trial well	533·4	109·2	64·40	31·78	23·94	4·48
2	S. M. Railway ...	Shivarie Station Banur well ...	74·2	17·01	6·09	12·60	13·44	4·20
3	Do. ...	Do. nála 1 M. N.	123·9	19·43	7·21	4·20	5·04	4·76
4	G. I. P. Railway ...	Mádha Station well	151·2	30·80	35·98	5·60	4·13	5·32
5	Junágad Railway ...	Verámul Station well	91·7	30·24	4·55	12·88	5·53	1·96
6	Do. ...	Junágad Station-yard well ...	95·2	12·32	4·06	15·12	5·32	4·20
7	Do. ...	Kishod well	27·3	2·80	·28	...	...	...
8	Do. ...	Mália Station well	28·7	3·22	·84	...	...	...
9	Political Agent, Cutch.	Koond No. 1	51·1	16·80	3·43	7·42	3·85	3·08
10	Do. ...	Boring No. 1	98·7	38·50	8·96	11·82	5·04	1·40
11	Do. ...	Koond and Boring No. 1 ...	97·3	38·50	9·17	12·18	5·32	1·40
12	Do. ...	Koond No. 2	63·7	22·68	5·25	9·73	3·85	1·54
13	Do. ...	Koonds 1 and 2 and Boring 1...	84·0	35·00	8·47	11·48	5·11	1·82
14	Do. ...	Boring No. 2	197·4	72·24	20·23	18·48	8·89	·56
15	Commissary General.	Aden Aqueduct	490·7	130·20	121·45	37·24	44·38	4·06
16	R.-M. Railway ...	Khoráia Station well	98·0	21·28	0·53	4·48	3·15	2·66
17	Municipality ...	Bhusával well, A	102·9	13·86	5·32	11·90	10·71	4·90
18	Do. ...	Do. do. B	135·1	19·32	7·35	10·15	12·46	4·55
19	Do. ...	Do. do. C	90·3	12·18	3·64	8·75	12·46	5·25
20	Officer in charge Station Hospital	Neemuch well, No. 8	28·0	2·10	0·84	8·70	Traces.	3·50
21		Do. do. No. 12	22·4	1·54	1·68	6·82	Traces.	2·80

48. *Ghee, Flour, &c.*—12 samples of ghee were examined. Of these one was a standard sample prepared by Dr. Deshmukh from buffalo's milk. This was found to have a specific gravity at 100° F.—(water at 100° F. = 1000)—of 912, and to yield 6·00 per cent. of volatile acid estimated as butyric acid. 8 more of the samples were forwarded by the Magistrate of Kaira; these were all good or fairly good, their specific gravity ranging from 912 to 914, and their volatile acidity from 5·45 to 7·13 per cent. A tenth sample was purchased in the bázár in Bombay; the specific gravity of this was 907, and its volatile acidity only 4·28 per cent., indicating a certain amount of adulteration. The eleventh sample was forwarded by the Magistrate of Kapadvanj; this had a specific gravity of 916 and gave volatile acidity 3·23 per cent.; it was worse, therefore, than the Bombay sample. The last sample was sent by the First Physician, Jamsetji Jijibhoy Hospital; its specific gravity was 909, and 2 experiments on it for volatile acidity, gave respectively 2·10 and 1·99 per cent. 6 samples of grain or flour were examined as to their fitness for food. Of these 2 were sent by the Collector of Thána, 1 by the Magistrate of Kaira, 2 by the Medical Officer 10th N. I. at Loralai, and 1 by the Head Constable, Shevgaon. Some of these were old and dirty, but none were sufficiently bad to warrant their being declared unfit for human food.

49. *Sundry Substances.*—The remaining matters examined during the year were as follows:—(*a*) 5 bottles of fluid forwarded from Karáchi found in

possession of a man charged with debasing silver coin. The contents of these bottles were as follows :—2 contained strong nitric acid. 1 contained a small quantity of a solution in nitric acid of silver and copper. Another contained a quantity of finely divided metallic silver, and some fluid similar in composition to that contained in the last-mentioned bottle, and the fifth contained a quantity of finely divided metallic silver and some water. The contents of these bottles, therefore, were such as would be obtained in the process of rupee sweating mentioned in previous reports, *viz.*, steeping the coin in strong nitric acid, and subsequently precipitating the silver by metallic copper. (*b*) Sundry matters from a sea-water tank at Butcher's Island, in which an electric cable had been stored, were examined at the request of the Engineer in charge. It had been observed that a white deposit formed in the tank. This on examination proved to consist mainly of sulphur (33·65) and carbonate of lime (65·46) per cent. With the view of ascertaining the cause of this deposit the following other matters were examined :—(1) A portion of the concrete lining of the tank ; this on examination was found to contain traces only of sulphates, and hence was not the source of the sulphur present in the deposit. (2) and (3) 2 specimens of sea water—(2) being a specimen of sea water on first admission to the tank, and (3) a specimen after it had been in the tank in contact with the cable for a month. On examination (3) was found to contain about 40 per cent. less combined sulphuric acid than (2), indicating that a portion, at any rate, of the sulphur in the deposit, came from the decomposition of the sulphates of the sea water. Lastly, in connection with the same investigation a portion of the cable was stored in an iron tank of fresh water for 1½ months. At the end of that time no deposit similar to that noticed in the sea-water tank had formed. The only change that occurred was, that in the water at the end of the period stated, a small quantity of sulphide of iron was found suspended. (*c*) 2 samples of clay, found in excavating for the construction of the Victoria Dock, were quantitatively examined at the request of the Engineer of the Bombay Port Trust. (*d*) 2 samples of earth were examined at the request of the Agent, Idar State. These contained minute yellow metallic-looking particles of iron pyrites which had been mistaken for particles of gold. (*e*) A sample of earth and one of water from a field in Ratnágiri were examined at the request of the Superintendent, Revenue Survey, the question being how far the fertility of the field was affected by the presence of salt. The water was found to contain about two-sevenths of the quantity of common salt present in sea water, and the soil about 2·70 per cent. of common salt. (*f*) A sample of "Rangoon oil" was examined at the request of the G. I. P. Railway Company. This was found to become thick and pasty at 60° F., and to flash at 114° F. (Abel). (*g*) Lastly, one sample of dynamite and one of blasting gelatine from the magazine at Durgi, Murnai Pass, were examined as to condition ; both were found to be free from exudation, and to pass the heat test.

50. The duties of Chemical Analyser to Government up to February 15th of the year under report were carried on by Surgeon A. Milne, M.B., and from the date referred to the end of the year by myself. During the whole of the year the onerous duties of Assistant Chemical Analyser to Government were carried on by Assistant Surgeon M. G. Deshmukh, M.D., with the same care and diligence as I have in previous reports had the pleasure of bringing to the notice of Government.

I have the honour to be,

Sir,

Your most obedient Servant,

I. B. LYON, F.C.S., F.I.C., Brigade Surgeon,
Chemical Analyser to Government.

No. 2066.

GENERAL DEPARTMENT.

Bombay Castle, 16th June 1888.

Letter from the Surgeon General with the Government of Bombay, No. 2845, dated 29th May 1888—Submitting with his remarks the report of the Chemical Analyser to Government for the year 1887.

RESOLUTION.—The report of the Chemical Analyser to Government for the year 1887, though devoid of any special features of interest, contains as usual an exhaustive review of the operations carried on in his office during that period. These were on a more extended scale than in any other of the last five years, for which comparative statistics are given, the total number of medico-legal cases reported upon and analyses effected having amounted to 1,548, or nearly 100 more than the highest figure previously recorded for any one year. This increase of work was due to the unusually large number of samples of water tested for their potable qualities, and to the necessity which arose under the new Tariff Act, introduced last year, of testing *all* imported potable spirits with a view to ascertaining their real alcoholic strength. In consequence of the large increase of work thus thrown upon the Chemical Analyser it was arranged that three of the senior guagers of the Customs should receive instruction in alcoholometry which has been done and the work of testing such spirit is now carried on by the Custom-house staff.

2. The number of medico-legal cases reported upon was 282 as compared with 296 in the previous year. They are distributed as usual under the three main heads of (1) suspected poisoning of human beings (159, the same figure as in 1886); (2) suspected cattle-poisoning (84 or one more than in 1886); and (3) Miscellaneous, which were 39 in number, or in other words decreased by 15. In 52·2 per cent. of the cases of suspected poisoning of human beings poison was detected as against 51·7 in the preceding year. In these cases, which numbered 84 (of which 8 came from Native States and the Central Provinces), 95 persons were, as far as can be ascertained, affected by the poison, and 37 died. Of these deaths 17 at least were cases of suicide, and 2 were the results of attempts of women to procure abortion. Arsenic and arsenical preparations were as usual the substances most extensively used, 50 per cent. of the cases in which poison was detected being referred to this drug. It is noticeable that opium was fatal in each case in which it was taken, and that in every case but one it was self-administered, and in a majority of cases by women. Two cases of attempted poisoning by strychnia are recorded, and in both of these the poison was used by the children of police constables, who extracted it from their fathers' bags. The fact should be brought to the notice of the Judicial Department, that steps may be taken to urge upon District Superintendents of Police the necessity for the issue of instructions to the police officers to whom poison is given for the destruction of dogs to exercise the greatest care in seeing that it does not fall into the hands of other persons.

3. Eighty-four cases of alleged cattle-poisoning were submitted for examination, or 1 more than in the previous year. In 50 of these 57 animals (2 being dogs) were apparently destroyed. The number of animals (16) killed in Ahmednagar was high, indeed it is the highest figure given for any district during the last seven years. This form of crime, as far as can be judged from such returns as these, which however can but represent a proportion of the total number of cases actually occurring, continues to be common in Poona and Sholápur as well as in the above-named district.

4. The samples of potable water sent during the year for examination numbered 207, and of these 134 were classed as good. Those sent from Broach (5), Surat (2) and Násik (3) are reported to have been uniformly bad; and it is hoped that steps have been taken by the Municipalities of these towns to prevent their use for drinking purposes, or to improve the condition of the

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wells and tanks which have been so unfavourably reported upon. The majority of the samples are sent from municipal towns or head-quarter stations, and Government would be glad to observe a larger number of instances of district officers during their tours selecting and forwarding for examination specimens of the water drunk in outlying villages, especially in tálukás liable to recurrent attacks of cholera.

5. The Commissariat stores examined were of the usual kind, including beer, porter, tea, sugar and other articles of food, drink and use for sanitary purposes. Samples of beer from the Deccan Brewery Company were for the first time sent for analysis. Dr. Lyon makes no special remark upon them beyond giving the usual statistical figures from which it would appear that the liquor is of fair quality, light and somewhat more acid than the other samples analysed. In paragraph 30 of his report the Chemical Analyser gives the result of some experiments made for the purpose of obtaining a highly concentrated fortified lime-juice for Commissariat purposes. The result of these experiments has been communicated to the department concerned, and if the liquid obtained is found to answer the purpose for which it is required, its substitution for the unconcentrated article would effect a saving of four-fifths of the space at present taken up for the carriage of this essential antiscorbutic by troops upon the march, or upon other occasions upon which economy of space is a desideratum.

6. For the Customs and Excise Departments 652 analyses were made during the year, 365 being of petroleum, 234 of imported alcoholic liquors, 10 of country spirits, 21 of opium and 22 of explosives and sundries of different kinds. The cause of the large number of samples of imported alcoholic liquor examined has been referred to in paragraph 1. It appears that samples of country liquor containing copper were submitted from their districts by the Collectors of Khándesh and Kánara, and Government trust that steps were in each case taken to investigate and, if necessary, to punish the vendor for an act of carelessness so injurious to the health of his customers.

E. LAWRENCE,
Acting Under Secretary to Government.

To

The Surgeon General with the Government of Bombay,
The Sanitary Commissioner,
The Municipal Commissioner for the City of Bombay,
The Commissioner of Police, Bombay,
All District Superintendents of Police,
All Collectors, including the Collectors and Deputy Commissioners in Sind,
The Commissioner, N. D.,
The Commissioner, C. D.,
The Commissioner, S. D.,
The Commissioner in Sind,
The Commissioner of Customs, Salt, Opium and A'bkári,
The Revenue Department of the Secretariat,
The Judicial Department of the Secretariat,
The Political Department of the Secretariat,
The Military Department of the Secretariat,
The Compiler, General Administration Report for 1887-88.
} With copies of the report.

The Director of Land Records and Agriculture,
The Editors' Table, Bombay,
The Branch Editors' Table, Poona, *care of* the City Magistrate, Poona,
The Editor *Dhárwár Vritt* (for his own use and for the use of other Editors of newspapers in Dhárwár),

The Government of India,
The Secretary of State for India.
} By letter.